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ABSTRACT

It is proposed that, contrary to traditional thinking, interdisciplinary communication can be enhanced, not limited, by specialization. A thorough understanding of common elements within any one discipline provides the bridge between disciplines. Two sets of examples of issues are examined. The first focuses on three disciplines in the social sciences (cognitive science, sociobiology, and behaviorism), and suggests that theories in these disciplines share common ground in terms of providing mechanistic explanations of human intelligence and human development, and critiques of the theories share common ground as they move to reinstate the primacy of such qualities as meaning, intentionality, consciousness, and free will. The second set of examples focuses on how issues pertaining to objectivity and subjectivity pervade such disciplines as philosophy, moral-development psychology, psychoanalysis, anthropology, sociology, and English literature. Again, common features of critiques are highlighted to illustrate how understandings within one discipline can help with understanding common problems and issues in others. The way in which specialization, and not simply a broad, liberal education, provides a powerful means for interdisciplinary communication is discussed. Includes 47 references. (MSE)

Communication in an Era of Specialization

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Like many others, I am concerned with the problems our society faces as its members become increasingly specialized. One of these problems is that people are increasingly unable to understand one another, let alone understand the complex issues in our society. In addressing this problem, one traditional approach has been to attempt to complement specialized education with an education that is broad and encompassing. For example, In The University of Utopia, Robert Hutchins (1953/1964) argues that people who specialize in the various disciplines must be grounded in a liberal education, as that education provides the basis for communication with others, and the ability to shed light on other disciplines and be informed by them.

This traditional view seems to me quite sensible and important. Yet, in this paper, I seek to extend it by proposing that it is also precisely through specialization that interdisciplinary communication can be enhanced. This is not to say, of course, that communication is thus always enhanced. But my contention will be that when specialization is undertaken rightly (and more will have to be said about what I mean by this), common fundamental problems can be seen to arise across disciplines, common moves made, and common solutions proposed. Thus a thorough understanding — achieved through specialization — of common elements within any one discipline provides the bridge between the disciplines.

To support this contention, I shall examine two broad sets of examples of issues. The first set, more constrained in scope, will focus on three disciplines in the social sciences: cognitive science, sociobiology, and behaviorism. I will suggest that theories in these disciplines share common ground in terms of providing mechanistic explanations of human intelligence and human

development; and that critiques of these theories share common ground as they move to reinstate the primacy of such qualities as meaning, intentionality, consciousness, and free will. The second set will take a more expansive turn, focusing on how issues pertaining to objectivity and subjectivity, loosely defined, pervade such disciplines as philosophy, moral-developmental psychology, psychoanalysis, anthropology, sociology, and English literature. Common features of critiques will again be highlighted to illustrate how understandings within one discipline can provide a means of understanding common problems and issues in others. I will then conclude by considering further how specialization, and not simply a broad, liberal education, provides a powerful means for interdisciplinary communication.

From this agenda, it can be noticed that it is not until the conclusion that this paper directly takes up how specialization works. I wait this long, since I am wary of moving too fast to abstract characterizations of the interdisciplinary endeavor without doing a bit of it first. For, in part, it is in the doing that the abstractions gain meaning; it becomes easier, for example, to convey how issues within disciplines can at times and to varying extents be isomorphic with one another, yet themselves embedded in issues that are not. In addition, the very engagement with the interdisciplinary endeavor allows the reader to evaluate and critique the ground on which the concluding abstractions arise.

Mechanistic Explanations of Human Behavior

Of the three disciplines to be considered here, I shall start with cognitive science. Many theories in cognitive science draw conceptually on Turing's (1950/1981) criteria for testing whether a machine's intelligence is comparable to human intelligence. Roughly stated, Turing proposed the following: Put a machine and person in a room next door. A human asks them

questions. If, through considering the content of the answers, a human cannot tell the difference between the machine and human, then the machine's intelligence is comparable.

The defining criteria in this test focus on the production of correct content knowledge or behavior (e.g., a correct verbal or written response), and are drawn upon by theories to model intelligence mechanistically. For example, in the field of artificial intelligence, McCarthy (1977) has proposed that it is possible to duplicate human knowledge through correct procedural representation of facts in the memory of a computer. In addition, for McCarthy (see Searle, 1984), machines as simple as thermostats can be said to have beliefs and to intentionally regulate the climate of an area. A similar approach toward understanding human intelligence also guides cognitive psychologists who emphasize building cognitive models that exhibit the behavior being studied (Klahr, 1976), define conceptual knowledge as procedural knowledge (Greeno, 1976), and centrally test theories based on measures of frequency of successful performance on a task and performance speed (Anderson, 1980).

Consider now sociobiological theories. According to sociobiologists, human behavior can be explained in terms of the biology of natural selection. In the last few decades, these explanations gained cogency as they began to account for apparently "altruistic" behavior. For example, Hamilton proposed that parental altruism to children, and even individual altruism to other kin, maximally perpetuates the actor's gene pool. Trivers (1971) proposed that altruism between strangers actually increases the actor's survival fitness, given that reciprocal altruism is programmed into the majority of a species. The mechanistic nature should be clear: As Dawkins (1976) says in the introduction of his book, The Selfish Gene, "We are survival machines — robot vehicles blindly programmed to preserve the selfish molecules known as genes" (p. ix).

Moreover, sociobiological theories define human intelligence using criteria not unlike that proposed in the Turing test. For example, Dawkins compares human intelligence to a guided missile.

> Guided missiles, for example, appear to search actively for their target, and when they have it in range they seem to pursue it, taking account of its evasive twist and turns, and sometimes even "predicting" or "anticipating" them....Nothing remotely approaching consciousness needs to be postulated, even though a layman, watching its apparently deliberate and purposeful behavior, finds it hard to believe that the missile is not under the direct control of a human pilot. (p. 54)

Thus, according to Dawkins, similar to guided missiles, genes determine human behavior without the supposition of purposeful or intentional action.

Another example further clarifies this point. Among his wealth of biological observations, Dawkins describes one species of butterfly that mimics the color and pattern of a poor tasting species of another butterfly. Through this process, the mimicking species protects itself from preying birds. Dawkins (chap. 3 & 4) refers to the mimicking as deceiving and lying, and is quick to point out that such actions are devoid of intentionality. Female butterflies, for example, do not intentionally pass on a particular coloring and pattern to offspring. So, then, does Dawkins argue for the evolution of deception and lying among humans. The acts serve survival functions, and the terms should be analyzed functionally, without reference to intentional behavior.

As a third group, consider behavioristic theories in psychology. According to these theories, behavior is shaped by contingencies of reinforcement. In turn, what an organism finds reinforcing depends in part on what promotes its survival. Moreover, like in cognitive science and sociobiology, behavioristic theories redefine intentional behavior mechanistically. For example, Skinner (1971/1980) says that a "person acts intentionally...not in the

sense that he possesses an intention which he then carries out, but in the sense that his behavior has been strengthened by consequences" (p. 103). More generally, Skinner says that in his theory "What is being abolished is autonomous man — the inner man...the man defended by the literatures of freedom and dignity" (p. 191).

Turning briefly to critiques of these theories, they, too, share common ground. For example, through use of what has become known as the "Chinese room thought experiment," Searle (1981) has offered a rebuttal to the Turing test, wherein he argues that meaning is central to what it means to know something. Roughly summarized, Searle asks us to consider the case of an English speaker who has an algorithm with which to manipulate Chinese symbols so as to always give coherent and accurate responses. Though a Chinese person, asking questions from another room, may not be able to differentiate the responses of this English speaker from a native Chinese speaker, it is not reasonable to propose, according to Searle, that the English speaker understands Chinese. He can manipulate unmeaningful symbols; that is all. And, that, according to Searle is all that a computer does.

Kitcher (1985) makes a similar move when he argues that sociobiology oversteps itself when it attempts to assimilate essentially human characteristics in an otherwise impressive biological account of animal behavior. Notice, for instance, that while Dawkins argues that lying and deceiving need only be conceived in terms of its functional equivalent, humans do otherwise. That is, humans differentiate between unintentionally misleading someone (e.g., giving directions that one thought were correct but actually were not), which we seldom refer to as deceiving or lying, and intentionally misleading someone (e.g., purposefully giving someone incorrect directions), which we usually refer to as deceiving or lying. The importance of this intentional component is manifest, for instance, in our courts of law which differentiate between

manslaughter and first-degree murder: While both cases can be functionally equivalent (X kills Y in identical circumstances), they differ on whether the killing was done intentionally.

It is again this move toward internal rather than simply external explanation that guides Chomsky's (1959) substantive critique of Skinner's theory. Chomsky argues that human explanation requires, "in addition to information about external stimulation, knowledge of the internal structure of the organism, the ways in which it processes input information and organizes its own behavior" (p. 27).

In sum, though theories in cognitive science, sociobiology, and behaviorism differ on important dimensions, they all share a mechanistic explanation of human behavior. Each redefines functionally and thus treats as epiphenomenon such characteristics as consciousness, meaning, understanding, beliefs, internal structures, intentionality, virtues, free will, and human dignity. In turn, rebuttals to such mechanistic theories seek to develop the importance and place of such characteristics in explanations of human behavior and in understanding the human condition.

The Objective versus Subjective Orientation

This second set of examples draws on the distinction between an objective versus subjective orientation. These orientations play out most clearly in the discipline of philosophy, and specifically epistemology — the study of the limits and validity of knowledge. Roughly stated, an objective orientation is that knowledge corresponds to or approaches a correspondence with a reality that exists independent of human means of knowing or, minimally, relies less on an individual's particular makeup and position in the world (D. Boyd, 1989; R. N. Boyd, 1988; Sturgeon, 1988). In turn, a subjective orientation is that knowledge can be true only subjectively for an individual

depending on that individual's desires, preferences, and goals (Rorty, 1982; Dewey, 1929/1960; Ayer, 1952; Mackie, 1977).

While some philosophers argue over these rival perspectives, others attempt to integrate the two, or at least hold both together. For example, Nagel (1986) argues that the central philosophical problem is "how to combine the perspective of a particular person inside the world with an objective view of that same world" (p. 3). He further argues that there are

> ways in which the two standpoints cannot be satisfactorily integrated, and in these cases...the correct course is not to assign victory to either standpoint but to hold the opposition clearly in one's mind without suppressing either element. (p. 5)

Nagel develops these perspectives in relation to moral theory, as do others. For example, Scheffler (1982, 1986) seeks to develop moral theory where the content of morality, conceived from an impersonal perspective, is constrained by subjective considerations — "by considerations of the agent's psychology and well-being, and of the ways in which it is appropriate for morality to enter into an agent's life, and to impinge on his or her thought, deliberation, feeling, and action" (Scheffler, 1986, p. 537).

It is something of this tension that carries over into controversies in moral-developmental psychology. Most notably, Kohlberg's (1969, 1984) theory of moral development has been criticized by Gilligan (1982), Noddings (1984), and others for focusing too much on an objective, universal, and impersonal conception of morality. These theorists argue that this conception is male-oriented. In contrast, females, it is claimed, are oriented to an ethic of care. As Noddings (1984) says, women "give reasons for their acts, but the reasons point to feelings, needs, situational conditions, and their sense of personal ideal rather than universal principles and their application" (p. 96). In response to such critiques, Boyd (1989) and others typically give credence to

both perspectives, argue for their interdependence, and show how the Kohlbergian perspective actually embodies within it a rich conception of human persons and character. Thus, with gender aside, at stake, following Nagel above, is the relation between the perspective of a particular person inside the world (Gilligan's and Noddings' emphasis) and an objective view of that same world (Kohlberg's emphasis, as characterized by Gilligan and Noddings).

With gender not aside, at stake is how well the distinction characterizes the moral orientation of men and women, and whether such characterizations promote or hinder equality between the sexes. After all, these characterizations are not so very different from "sexist" ones past and present. To illuminate one from the past, Rousseau (1762/1979) has said that "men's passions are restrained by reason, women's passions are restrained by modesty" (p. 359), and that "women ought to be passive and weak" (p. 358). A quotation from Miss Minnesota of 1969, a runner-up to the title of Miss America, illuminates one from the present: "Women shouldn't try to run things because they are more emotional and men can overcome their emotions with logic" (Martin, 1969, p. 164). These purportedly sexist characterizations would appear to support the overall proposition that men embody a rational, impersonal, and objective perspective, while women an emotional, personal, and subjective perspective. Given that such characterizations are not far afield from Gilligan's, who, then, is the sexist, who the feminist? This disturbing similarity explains why Gilligan, who is often viewed as supporting feminist theory by giving credence to a woman's "different voice," is, in contrast, viewed by others to buy into existing sexist stereotypes.

To highlight further the common threads across disciplines, it is worth noting that the structure of this gender argument is remarkably congruent with one current in moral philosophy. Annette Baier (1985) among others has argued that moral philosophy has been dominated by an inherently male focus

on theories of moral obligation and justice. These theories, it is claimed, contrast with those based more on an ethic of love, which are developed more by women philosophers. In turn, Scheffler (1986) has incisively responded to this critique, making moves not unlike those made by Boyd (1989) in addressing feminist critiques of Kohlberg. While not discounting the possibility for some gender differences, Scheffler questions the evidence for fundamental differences, and suggests that such broad gender categorizations do more to mislead than illuminate.

The tension between an objective and subjective orientation can also be seen in the general field of psychology. For instance, traditional psychologists who aim to gain objective knowledge about the human condition have in recent years been critiqued from a hermeneutic perspective (see Packer, 1985). From this perspective, human action is proposed to have semantic rather than logical or causal organization. As Ricoeur says (in Blight, 1981) the structure of interpretive inquiry must be a "logic of double meaning...no longer a formal logic, but a transcendental logic established on the conditions of possibility" (p. 167). That is, rather than seek for general principles or formal structures, the hermeneutic approach seeks to provide meaningful interpretations of human action. Thus the hermeneutic emphasis is on a subjective rather than objective explanation.

Interestingly, sometimes hermeneuticists reinterpret as subjective that which was proposed to be objective. For example, with little doubt Freud viewed his enterprise as scientific, one where he sought to discover objective and generalized psychological laws of nature: "Psychology, too, is a natural science. What else can it be?" (Freud, 1940, p. 282) Freud's rhetorical question has been answered by hermeneuticists (among others) who claim that psychoanalysis is hermeneutics. For instance, Steele (1979) proposes that "psychoanalysis does not provide causal explanation, but reasonable interpreta-

tions that help make the past intelligible." According to this perspective (see also Ricoeur, 1970) these interpretations are not to be taken as objective truth of the patient's past, but create the truth, or as Jacobsen and Steele (1979) say, "are guidelines for the construction of reality" (p. 359). Thus truth from this perspective depends on the extent and quality of meaning the patient (and perhaps the therapist) subjectively derives from the interpretation.

Moving now to another discipline, cultural anthropologists directly take up this issue of objectivity and subjectivity when they ask two related questions: On what basis can we objectively understand other cultures, and, based on such understandings, on what basis can we judge other cultures? In effect, the first question expands on one posed in work in the philosophy of mind. Instead of pointing to the difficulty of understanding another person (How do we really know what another person thinks or feels?), it is taken cross-culturally to point to the difficulty of understanding people from another culture. In responding to this question, one major school of thought (e.g., Geertz; 1983; Shweder, 1984) proposes that all knowledge is culturally constituted, thus providing objective descriptions of different cultures can only be done, if at all, weakly, in terms of a "thin" description, because one is not part of the culture through which meaning is derived. This limitation has led to an alternative methodology in which the anthropologist spends a considerable amount of time living in and becoming part of a specific culture so as to understand better that culture's knowledge: in effect, you have to be one to know one. But the more an anthropologist does this, thus providing "thick" descriptions, the more subjective the descriptions become, as the more they come under the sway of that culture's knowledge system.

Based on the proposition that knowledge is culturally constituted, an answer to the second question — On what basis can we judge another culture? — is often forthcoming: We can't. This is a view of cultural relativism, which,

according to Herskovits (1972), "recognizes the values set up by every society to guide its own life and that understands their worth to those who live by them, though they may differ from one's own" (p. 31). In other words, because knowledge of what is right or wrong (as is all knowledge) is culturally constituted, and cannot be objectively grounded, it is not possible for one culture to morally judge another.

Now, both questions that concern understanding and judging other cultures tap an extensive array of complicated issues that for purposes here I wish mainly to step around. (For further discussion, see, for example, Spiro, 1984, and Williams, 1985). One critique, however, is worth mentioning, as it will come up in other ways shortly. This is the critique, made popular by Williams (1972), that a relativistic view seeks to transcend its own cultural bias by making a universal (third person) proposition that purports to apply to everyone. Thus this view either successfully commits what it says cannot be done (establishing an objective judgment), thus nullifying its own view, or relegates itself to being culturally bound, and a largely inefficacious statement.

These same tensions between objective and subjective descriptions, as well as between objective and subjective evaluations, play out in the sociological as well as anthropological literature. Notably, there is a prominent school of thought called social constructionism that similarly argues that all our beliefs and theories are but products of our society, determined by the overarching cultural and historical context (Hogan, 1975; Kessen, 1979; Sampson, 1977, 1981). Thus while hermeneuticists propose that the individual creates meaning, social constructionists propose, as do many cultural anthropologists, that society or culture creates meaning. They all agree, however, that knowledge cannot be objectively ground.

This social-constructionist position has recently been critiqued by Turiel (1989), and it is interesting to note that one of the critiques parallels Williams' critique of cultural relativism. Paraphrasing Turiel, either social construction has no greater validity than any other viewpoint, which social constructionists would reject, or it is self contradictory in that it asserts the very proposition it is designed to reject: namely, that there are standards that transcend culture by which to judge the validity of a theory.

Moving finally and again quickly to another discipline, consider similar issues in literary criticism. In a recent article in The New York Review of Books, Crews (1989) reviews Gillman's (1989) book on Mark Twain. According to Crews, Gillman seeks to "historicize" Twain, by showing that he was but a child of his culture. "Implicated in continuing American practices, and lacking full autonomy as a reflective consciousness, he [Twain] fell in with the self-protective mental strategies of his day" (p. 39). According to Crews, this approach to historicizing an author's work is based on a form of literary criticism that reduces individual values and ideas to culture. This literary theory is called social constructionism. Moreover, corresponding to William's philosophical critique and Turiel's sociological critique, Crews' critique of literary social constructionism includes a note about its inconsistency: "Inconsistent because, of course, social constructionists have no stomach for seeing their own values, ideas, and selves submitted to reductive analysis" (p. 39).

Conclusion

To return now to my central contention: It is that specialization, undertaken rightly, far from hindering interdisciplinary communication, has the potential to engender and enrich it. To provide some support for this contention, I have tried to show common ground between the disciplines, and convey a sense of how I perceive the interdisciplinary endeavor. Yet in

promoting this endeavor with students — promoting communication in an era of specialization — why does a broad, liberal course of study limit the endeavor, and why and how does specialization extend it?

My answer is this: Without specialization, it seems to me that the complexity to each area of study makes it difficult for most students to ferret out the common issues from unique, the large issues from small, and the sophisticated conceptions from muddled. With specialization, the student learns of the inner aspects of a theory such that, stepping back from it, the various aspects can be put in a perspective. That is, through extensive investigations within a single discipline a complex set of data or issues can be analytically and intuitively wrestled with, organized, and then used as the basis to inform on and draw from other disciplines.

An analogy, which I shall connect to earlier examples, may help convey what I mean here. Imagine a set of twenty jig-saw puzzles. Each puzzle is itself shaped (when completed) as a puzzle piece that fits a larger puzzle, comprised of the set of puzzles, which I shall call the Big Puzzle. Further, and more abstractly, imagine that each piece and any set of pieces from an individual puzzle portrays a picture that in various ways and to varying extents is isomorphic with pictures from the other pieces or set of pieces, within an individual puzzle or throughout the Big Puzzle. Now, assuming that the Big Puzzle is too big and complex ever to solve, then one powerful method by which to know something about what the Big Puzzle looks like is to focus on solving one individual puzzle, or portion of puzzle. For through this method of specialization, the very shape of an individual puzzle will dictate aspects of the other pieces with which it fits, thus providing information about them. In addition, given that each piece or set of pieces is in various ways and to varying extents isomorphic with the other pieces or set of pieces, one can hazard general guesses from what one knows to what one does not.

Completing the analogy: if we let each puzzle represent a discipline, the puzzle pieces the data and issues comprising the discipline, and the Big Puzzle the entire set of disciplines, it similarly follows that specialization can provide an important means toward interdisciplinary understanding.

This analogy can also help clarify what it means to undertake specialization rightly, as it is clearly not my view that any sort of specialization will do. Rather, in specializing, two endeavors are essential, both of which are often sorely lacking in those who specialize, and in those educational institutions, such as graduate schools, that specialize in creating specialists. The first endeavor is to pay attention, with analytical rigor and intuitive insight, to how one's discipline (puzzle piece) can fit with other disciplines (puzzle pieces). Thus, for example, it was shown how literary criticism has partially joined with sociology to help establish a literary theory of social constructionism. This endeavor can also lead to the creation of new areas of study. For example, sociology and biology have been joined to create sociobiology, neurology and psychology to neuropsychology, psychology and linguistics to psycholinguistics, astronomy and physics to astrophysics, and biology and chemistry to biochemistry.

The second endeavor is to pay attention, again with analytical rigor and intuitive insight, to the potential isomorphisms between disciplines, anticipating that some will be clearer than others. Drawing on examples characterized earlier, I should hope the symmetry is fairly clear of how mechanistic explanations underlie theories in cognitive science, sociobiology, and behaviorism, and of how the idea that knowledge is culturally constituted plays out across the disciplines of philosophy, psychology, anthropology, and sociology. Less clear, though still distinguishable, for example, is the symmetry between the impersonal/personal debate in moral-developmental psychology, and the

epistemological problem of how to combine the perspective of a particular person inside the world with an objective view of that same world.

Finally, I should say that my original contention — that specialization, undertaken rightly, has the potential to engender interdisciplinary communication — does not replace the more traditional view mentioned at the outset of this paper that puts importance on a broad, liberal education. In fact, it likely depends upon it. That is, it could be very difficult indeed to undertake specialization in the way I have described without a liberal education. Yet I am suggesting that the former with the latter, specialization with a liberal education, provides the strongest basis for interdisciplinary communication, and a possible guide in thinking further about current programs in undergraduate and graduate education.

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